WASHINGTON STATE PATROL

CRIME LABORATORY DIVISION

STR TRAINING PROGRAM MANUAL

January 2018

TABLE OF CONTENTS

MODULE 1 - INTRODUCTION

INTRODUCTION

Welcome to the Washington State Patrol Crime Laboratory Division. This training manual is intended for candidates who have been successful in obtaining employment in a DNA Unit or CODIS Laboratory and for existing staff who are training in DNA STR analysis within the WSP Crime Laboratory Division. Unless otherwise specified, the trainee's immediate supervisor is the trainer. The time needed to complete the training program will be determined by the trainer and DNA Technical Leader.

1.1 Goal

1.1.1   The STR Training Manual is to guide the trainee to become sufficiently knowledgeable and proficient in Forensic DNA analysis to perform the role for which they have been employed.

1.1.2   Depending on the trainee's prior education, experience and background, demonstration of competency in each of the major areas may be all that is required to complete many of the modules.

 1.1.2.1   The technical leader shall be responsible for assessing the previous training of analysts/technicians with outside experience and ensuring it is adequate and documented. Modification to the training program may be appropriate and shall be approved by the technical leader.

1.1.3   If necessary, the Casework DNA Analyst trainee will also follow and complete the requirements outlined in the Biochemical Analysis Training Program Manual for a comprehensive training in Forensic Biology.

1.1.4   If Biochemistry training was not conducted at the WSP CLD, then Casework DNA trainees should refer to the Introduction and Safety sections of the Biochemical Analysis Training Program Manual concurrently with this section of the STR Training Manual.

1.1.5   The CODIS DNA Analyst trainees are only required to complete the sections that are relevant to their work duties and read – CA (for CODIS Analyst) designated references.

1.1.6   At the completion of this module, the trainee should be able to:

 1.1.6.1   Understand the expectations of the training program.

 1.1.6.2   Understand the general operation of the laboratory.

1.2 Tasks

1.2.1   The trainer will provide the trainee with the necessary instruction and reading materials to complete a training module.

1.2.2   The trainee will get instruction from a variety of trainers in DNA STR analysis and may include time spent at another WSP laboratory.

Alternatively, the training may be outsourced to an accredited vendor, such as the National Forensic Science Technology Center (NFSTC). All outsourced training will follow the guidelines set forth in this training manual with some modifications allowed. Any modifications to the training manual must be approved by the DNA Technical Leader and be documented in the trainees' training file.

 1.2.2.1   The method of instruction will include: reading, lectures, discussions, demonstrations, observing others perform casework and observation of others in court.

     1.2.2.2   The practical training will include: assisting in casework, assigned practice exercises and moot court.

1.2.3   Examinations will include written or oral tests, competency tests and a final qualifying test prior to casework assignment.

1.2.4   The trainee shall keep a training record as described in Section 1 of the Biochemical Analysis Training Program Manual.

1.2.5   The trainer will consult with the DNA Technical Leader to plan, schedule and report the progress of each trainee's program.

1.2.6   If required, the trainee will complete the new employee orientation modules on the training division iWSP website as required by the New Employee Orientation Supervisor Checklist.

1.2.7   The trainee will be oriented to safety within the laboratory.

1.2.8   The trainee will be introduced to Quality Assurance/Quality Control practices of the laboratory.

1.3 Assessment

This module should be completed by all new employees for both CODIS and Casework DNA analysis. The material should also be reviewed by experienced staff training in this area to ensure their knowledge is current. No practical exam is provided for this module. The trainer will assess the trainee's knowledge of the subject areas through discussion and will document the training using the trainer's evaluation form.

1.3.1   Knows the expectations of the training program.

1.3.2   Can explain the general operation of the laboratory.

MODULE 2 – SAMPLE AND/OR EVIDENCE CONTROL AND PRESERVATION

SAMPLE AND/OR EVIDENCE CONTROL AND PRESERVATION MODULE

2.1 Goal
2.1.1   If the Casework DNA Analyst trainee has not already completed the Biochemical Analysis Training Program Manual Section 3 – Sample and/or Evidence Control and Preservation section refer to this for discussion subjects.

2.1.2   The CODIS DNA Analyst trainee will need to cover only the areas specific to their work place duties (minimizing the risk of contamination).

    2.1.2.1   CODIS DNA Analyst trainees will also receive instruction for convicted offender sample receipt, handling and LIMS entry including the operation of the WSP W2 to LIMS-plus Interface program.

2.1.3   At the completion of this module, the trainee should be able to:

    2.1.3.1   Successfully explain the proper procedures and precautions to be taken when handling and preserving evidence for DNA, latent fingerprint analysis and crime scene reconstruction.

    2.1.3.2   Describe the order of examinations between the DNA Units, Trace Evidence Section, Chemistry Section, Firearms Section, Toxicology Section, Document Section and Latent Fingerprints.

    2.1.3.3   Successfully explain the administrative process for convicted offender sample receipt as well as their handling and preservation. (CA only)

2.2 Tasks
2.2.1   Instruction, demonstration and practical training will be provided in the areas listed.

    2.2.1.1   Sample collection for biological trace evidence in conjunction with other laboratory analytical services, crime scene reconstruction and latent fingerprint analysis.

    2.2.1.2   Minimizing the risk of contamination at a PCR level of sensitivity for detection. CA

    2.2.1.3   Convicted offender sample receipt, handling and LIMS data entry. (CA only)

2.3 Assessment
This module should be completed by all new DNA Analysts. CODIS Analysts are responsible for: evidence handling to prevent contamination and cross-contamination, Convicted Offender Form entry and receipt and handling of convicted offender samples. Casework Analysts are responsible for sample collection, evidence handling to prevent contamination and cross-contamination. All material in this module should be reviewed by experienced staff training in this area to ensure their knowledge is current. No practical exam is provided for this module. The trainer will assess the trainee's knowledge of the subject areas through discussion and will document the training using the trainer's evaluation form.

MODULE 3 –FUNDAMENTAL SCIENTIFIC KNOWLEDGE

FUNDAMENTAL SCIENTIFIC KNOWLEDGE MODULE

3.1 Goal

3.1.1   This module ensures that the trainee has the formal education and understanding of the fundamental scientific basis of forensic DNA analysis as required by national standards. (See FBI QAS Standards current version)

3.1.2   At the end of this session, the trainee will have shown:

    3.1.2.1   Documentation of college level course work covering the fundamental principles of genetics, biochemistry and molecular biology which provide a foundation for understanding forensic DNA analysis. Documentation of college level coursework in statistics or population genetics and/or training in statistics or population genetics as it pertains to forensic DNA analysis. CA

    3.1.2.2   An understanding of fundamental scientific knowledge as it applies to forensic DNA analysis. CA

3.2 Tasks

3.2.1   All trainees must produce a resumé stating their education, work experience and professional activities. CA

3.2.2   All trainees must also provide a copy of their college transcript(s). CA

3.3 Assessment

This module should be completed by all trainees. College level coursework must have been successfully completed by the DNA Analyst and CODIS Analyst trainees in genetics, biochemistry and molecular biology. The trainer will assess the trainee's knowledge of the subject areas through discussion and will document the training using the trainer's evaluation form. If the analyst does not have college level coursework or documented training in statistics or population genetics, then the trainee will complete statistics/population genetics training as it pertains to forensic DNA analysis.

MODULE 4 – APPLIED SCIENTIFIC KNOWLEDGE

APPLIED SCIENTIFIC KNOWLEDGE MODULE

4.1 Goal
4.1.1   This module is to build on the foundation of the fundamental scientific knowledge relating to the study of forensic DNA analysis.

4.1.2   The trainee will have in depth coverage or basic coverage of sections as they relate to their work place duties. At the end of this session the trainee should be able to:

    4.1.2.1   Pass a written exam on in depth knowledge appropriate to their duties. CA

    4.1.2.2   Discuss Forensic DNA topics in depth, appropriate to their duties. CA

4.2 Tasks
4.2.1   Each DNA analyst trainee (optional for experienced staff training in this area) will prepare and give a lecture presentation to WSP CLD scientific staff of between 20 to 30 minutes on a topic in which in depth knowledge is required.

    4.2.1.1   This will be followed by a brief question and answer period.

    4.2.1.2   The written dissertation of the presentation is also required.

4.2.2   There will be instruction and demonstration of the procedures that relate to the trainee's work place duties.

4.2.3   Trainers will discuss with trainees subject matter and published references as follows:

    4.2.3.1   DNA Extraction and Purification. CA

    4.2.3.2   DNA Quantification. CA

    4.2.3.3   Polymerase Chain Reaction (PCR) based DNA typing methodology. CA

    4.2.3.4   Short Tandem Repeat polymorphisms CA

    4.2.3.5   Y chromosome DNA Typing

    4.2.3.6   Single Nucleotide Polymorphisms (SNPs)

    4.2.3.7   Mitochondrial DNA

    4.2.3.8   Population genetics and statistics pertaining to Forensic DNA analysis   CA

    4.2.3.9   Automation in the Forensic DNA Laboratory CA

    4.2.3.10   Expert system software CA

    4.2.3.11   Rapid DNA systems   CA

    4.2.3.12   Next Generation Sequencing   CA

4.3 Assessment
This module will be completed in its entirety by Casework DNA Analyst trainees. CODIS DNA Analyst trainees need only complete CA designated sections and read the corresponding references.

4.3.1   A written exam is required to complete this section of training for all Casework DNA Analyst trainee and CODIS DNA Analyst trainees. CA

4.3.2   Each Casework DNA analyst trainee will be assigned to prepare and give a lecture presentation to WSP CLD scientific staff of between 20 to 30 minutes on a topic in which in depth knowledge is required. The written dissertation of the presentation is also required.

4.3.3   The trainer will document completion of this module by using the trainer's evaluation form.

MODULE 5 – LABORATORY ANALYSIS

LABORATORY ANALYSIS MODULE

5.1 Goal
    5.1.1   This module is to provide practical instruction to the trainee on the analytical procedures used in the laboratory.

    5.1.2   The Casework DNA Analyst trainee will perform analysis on biological samples that would be normally encountered in forensic casework.

    5.1.3   The CODIS DNA Analyst trainee will perform analysis on reference samples normally encountered in convicted offender submissions.

    5.1.4   The methods detailed in the WSP CLD STR Analysis Procedures manual or the WSP CLD CODIS Laboratory STR Procedures manual, as appropriate, will be employed.

    5.1.5   The trainee will document work done in a training notebook.

    5.1.6   At the end of this session the trainee should be able to:

        5.1.6.1   Competently perform DNA STR analysis on biological samples similar to what would be encountered in forensic DNA casework and/or convicted offender samples.

        5.1.6.2   Demonstrate good laboratory technique for DNA STR analysis.

5.2 Tasks
    5.2.1 Work to be assigned to the trainee

        5.2.1.1   Each Casework DNA Analyst will be assigned a number of samples sufficient to demonstrate the trainee's ability to competently conduct the laboratory's analytical procedures and produce reliable and accurate results. The following is a typical assignment: at least 50 single source samples followed by 10 single source competency samples, at least 7 samples for differential extraction and analysis, 3 contact/touch DNA samples (e.g. for wearer DNA), 10 hair samples, and 3 non-probative cases.

        5.2.1.2   These samples will reflect the variability, range, type and complexity of casework analysis and should include single source, differential, contact/touch, and hair samples.

          5.2.1.2.1 All of the samples will be processed using the Qiagen EZ1 robotic protocols. Assignment of samples for use with the organic extraction procedure is optional. If the organic extraction procedure is used for some of the single source samples, at least 10 single source samples will be purified using the organic procedure.

        5.2.1.3   CODIS DNA Analyst trainees will be assigned:

          5.2.1.3.1 A GeneMapper® ID-X training data set

          5.2.1.3.2 A GeneMapper® ID-X training data set composed of anomalies

          5.2.1.3.3 A practice set of 5 samples to be processed manually via extraction in the laboratory under direct observation of the trainer

          5.2.1.3.4 A GeneMapper® ID-X data set containing different types of contamination

          5.2.1.3.5 At least two training sets of ten samples (8 buccal and 2 blood) to process manually via extraction

          5.2.1.3.6 At least two training sets of ten samples to process manually via direct amplification

          5.2.1.3.7 At least two 96-well plate training sets of about 40 samples each to process with the BSD600 Duet Puncher and direct amplificationl

5.2.1.4   The following materials are available for further study should the trainer or trainee deem additional practice is necessary:

5.2.1.4.1 GeneMapper® ID-X data sets for data analysis practice

5.2.1.4.2 PowerQuant runs for standard curve and/or quantitation value evaluation

5.2.1.4.3 Example case files for worksheets and workflow practice

5.2.1.5   CODIS Analyst trainees will also be assigned 5 manual competency samples (extraction), 5 manual competency samples (direct amplification), and a set of 30 samples to process using the BSD600 Duet puncher and direct amplification (in conjunction with Training Module 9).

5.2.2   Laboratory analysis is to be performed by following the instructions in the WSP CLD STR Analysis Procedures Manual or the WSP CLD CODIS Laboratory STR Analysis Procedures Manual, as appropriate.

5.2.2.1   DNA Extraction (Lysis) and Purification.

5.2.2.2   DNA Quantification

5.2.2.3   Polymerase Chain Reaction (PCR) based DNA typing methodology.

5.2.2.4   Short Tandem Repeat DNA typing profiles.

5.2.3   The trainee must complete paperwork to be approved for CODIS access. CA

5.2.4   The trainer will discuss with the trainee the Sample Switch Detection Procedure.

5.3 Assessment

5.3.1   This module should be completed by Casework DNA analyst and CODIS DNA analyst trainees following appropriate tasks as they relate to their workplace duties.

5.3.2   All trainees must be able to generate reliable genotype data in a proficient manner.

5.3.3   The trainer will document the completion of this module by using the trainer's evaluation form.

MODULE 6 – MIXTURE INTERPRETATION, REPORT WRITING AND CODIS

MIXTURE INTERPRETATION, REPORT WRITING AND CODIS MODULE

6.1 Goal

6.1.1   This module is to provide practical instruction on how to interpret and report analytical results as designated by laboratory policy.

6.1.2   The DNA Casework Analyst trainee will receive instruction on the STR interpretation guidelines, the interpretation of mixtures, statistical interpretation, paternity/kinship, CODIS eligibility guidelines, report writing format, wording of conclusions, organization of the case file, Laboratory Information Management System (LIMS) data entry and management and use of the Popstats program from CODIS. Training on the use of the ArmedXpert™ program is optional. (Instruction of the DNA analyst trainee in the use of the ArmedXpert™ program will require the presence of a separately approved training plan.)

6.1.3   An introduction to the laboratory's CODIS program will also be provided.

6.1.4   There will be a number (sufficient to demonstrate competency – 20 is the standard) of sets of mixture data representative of casework provided to the Casework DNA analyst trainee to provide a written interpretation according to laboratory policy.

6.1.5   A selection of published reports will be provided that illustrate some casework applications.

6.1.6   Discussion of local notable case files should also be incorporated to provide an additional perspective into casework applications.

6.1.7   The CODIS DNA Analyst will receive instruction on CODIS data management.

6.1.8   At the end of this session the trainee should be able to:

6.1.8.1   Correctly interpret casework STR data and write reports compatible with laboratory policy.

6.1.8.2   Explain the laboratory's CODIS program including eligibility guidelines and how samples are searched and/or uploaded. CA

6.2 Tasks

6.2.1   Instruction will be provided in the areas listed:

6.2.1.1   STR interpretation guidelines.

6.2.1.2   Organization and contents of a case file.

6.2.1.3   Use of the ArmedXpert™ program (optional).

6.2.1.4   Statistical calculations.

6.2.1.5   Paternity/Kinship

6.2.1.6   Report writing and LIMS.

6.2.1.7   CODIS program. CA

6.2.1.8   The use of the CODIS Popstats Moderate Match Estimator (MME)

6.2.2   Work assigned to complete

6.2.2.1   Interpretation of 20 sets of mixture data representative of casework will be assigned.

6.2.2.2   The DNA Casework analyst trainee is to provide a written interpretation according to laboratory policy.

6.3 Assessment

This module should be completed by Casework DNA analyst and CODIS DNA analyst trainees as it relates to their workplace duties.

6.3.1   CODIS DNA Analyst trainees should complete only the CODIS related tasks.

6.3.2   Interpretation results from Casework DNA Analyst trainees will be evaluated by experienced Casework DNA STR analysts.

6.3.3   The trainer will document completion of this module by using the trainer's evaluation form.

MODULE 7 – Y-STR DNA TYPING FOR CASEWORK

Y-STR DNA TYPING FOR CASEWORK MODULE

The analysis of short tandem repeats on the Y chromosome utilizes the same technology and principles as autosomal STRs. The Y-STR trainee must be currently or previously qualified in autosomal STR analysis before undergoing the Y-STR training module.

7.1 Goal
    7.1.1   This module will provide the in depth scientific knowledge relating to the application of Y-STR's to forensic DNA analysis.

    7.1.2   This module will provide practical instruction to the trainee on the analytical protocols used in the laboratory for Y-STR amplification and analysis.

    7.1.3   This module will provide practical instruction on how to interpret and report Y-STR analytical results with established laboratory policy.

    7.1.4   At the end of this training session, the trainee should be able to:

        7.1.4.1   Pass testing (oral or written) on the basic concepts of the Y-chromosome and forensic Y-STR analysis.

        7.1.4.2   Competently perform Y-STR analysis on biological samples that would normally be encountered in forensic casework.

7.2 Tasks
    7.2.1   Trainers will discuss with trainees subject matter and published references on the following topics:

        7.2.1.1   Evolution, molecular biology and properties of the Y-chromosome

        7.2.1.2   Forensic applications of Y-STR analysis

        7.2.1.3   Amplification with the currently validated Y-STR amplification kit

        7.2.1.4   Typing of Y-STR amp product on a genetic analyzer

        7.2.1.5   Interpretation and reporting of Y-STR results

        7.2.1.6   Population databases and Y-STR statistics

        7.2.1.7   Testimony, Practice, and Observation

    7.2.2   Work to be assigned to the trainee:

        7.2.2.1   Analysis of 3 single source male DNA extracts.

            7.2.2.1.1   Purpose: Demonstration of kit components, amp procedure, and genetic analyzer set-up.

        7.2.2.2   Trainee will be provided with 6 sets of Y-STR data. The data sets will include one of each of the following types of samples: single source, partial profile, mixture with a major component, mixture with a deducible minor component, mixture with a known contributor, and an indistinguishable mixture.

            7.2.2.2.1   Purpose: The trainee will need to demonstrate the ability to appropriately interpret the data. They must be able to provide a mock report statement with conclusions for each scenario and should provide an appropriate statistical interpretation, when applicable.

        7.2.2.3   Final Evaluation: Trainee will complete one non-probative case competency test.

            7.2.2.3.1   Trainee will prepare full documentation of the analysis and interpretations in the format used for regular casework following the established WSP Y-STR, STR, and quality assurance casework procedures.

7.3 Assessment

    7.3.1   This module must be completed by any DNA analyst intending to perform Y-STR analysis on casework samples.

    7.3.2   Completion of a competency exam is required to complete this module of training regardless of prior Y-STR analysis experience.

        7.3.2.1   The competency exam will consist of 50% written questions and 50% oral questions (distinct from 7.2.1).

        7.3.2.2   The questions utilized and a summary of the trainee response for oral questions will be documented.

    7.3.3   The trainee must show that they can competently generate and interpret Y-STR data and demonstrate the understanding and use of a haplotype database and statistical interpretation.

    7.3.4   The trainer will document the completion of this module by using the trainer's evaluation form.

MODULE 8 – LEGAL ISSUES

LEGAL ISSUES MODULE

8.1 Goal
    8.1.1.   This training is to provide instruction and to prepare the Casework DNA Analyst trainee for court presentation in the State of Washington.

    8.1.2.   Unless the Casework DNA Analyst trainee has had previous DNA typing testimony experience, at least one moot court session must be conducted in preparation for giving testimony.

    8.1.3   The trainee should be encouraged to attend court and observe experienced forensic scientists testify. CA

    8.1.4   At the end of this session the trainee should be:

        8.1.4.1   Familiar with the legal system for Washington State as it pertains to expert witnesses.

        8.1.4.2   Able to provide unbiased, clear and easy to understand expert testimony on forensic DNA analysis.

8.2 Tasks
    8.2.1   Instruction will be provided in the areas listed

        8.2.1.1   Courtroom procedures and rules of evidence process

            8.2.1.1.1   Court structure (trial and appeals courts) CA

            8.2.1.1.2   Format of hearing or trial CA

            8.2.1.1.3   Discovery and admissibility rules CA

            8.2.1.1.4   Courtroom demeanor and attire CA

        8.2.1.2   DNA analyst qualifications CA

        8.2.1.3   Technical testimony CA

        8.2.1.4   Testimony practice (direct and cross examination)

        8.2.1.5   Ethical responsibility of expert witness CA

        8.2.1.6   Evidence/Exhibit presentation

            8.2.1.6.1   Handling of evidence

            8.2.1.6.2   Exhibit continuity

        8.2.1.7   DNA Database legal authority (State and Federal) CA

            8.2.1.7.1   Permissible samples/profiles CA

            8.2.1.7.2   Confidentiality/disclosure of information CA

    8.2.2   The analyst should review their curriculum vitae (resume) and observe expert testimony CA

    8.2.3   The analyst should participate in moot court testimony that includes direct and cross examination as well as the introduction of evidence/exhibits

8.3 Assessment
This module should be completed by Casework DNA Analyst trainees; limited readings are required for CODIS DNA Analysts.

    8.3.1   Participation in a minimum of 1 successful moot court is required to complete this module.

    8.3.2   The results of the performance evaluation will be retained by the laboratory as part of the trainee's file.

    8.3.3   The trainer will document completion of this module using the trainer's evaluation form.

MODULE 9 - FINAL EVALUATION

FINAL EVALUATION

9.1 Competency samples in the form of a mock case (or non-probative case) will be provided to the DNA analyst trainee (samples from Module 5 work can be used).

9.2 The Casework DNA analyst trainee will prepare full documentation of the analysis and interpretations in the format used for regular casework.

9.3 The CODIS DNA Analyst trainee will be provided with competency samples representative of what will be encountered in performing regular work duties. (see 5.2.1.5 – results from Module 5 can be used)

9.4 The CODIS DNA Analyst trainee will prepare full documentation of the analysis as required for convicted offender database entry.

MODULE 10 – COGNITIVE BIAS

BIAS MODULE

10.1 Goal

10.1.1   This training will provide the DNA analyst with an introduction to cognitive bias and its role in forensic science.

10.1.2   At the end of this session, the trainee should be:
10.1.2.1 Familiar with the different types of bias that can affect forensic science. CA
10.1.2.2 Recognize and minimize bias during the testing process. CA

10.2 Tasks

10.2.1   Cognitive Bias training will cover the following.
10.2.1.1 Cognitive, Contextual, and Confirmation Bias
10.2.1.2 Steps to minimize cognitive bias

10.2.2   Analysts should participate in a cognitive bias discussion annually in conjunction with the ASCLD Guiding Principles review. CA

10.3 Assessment

This module should be completed in its entirety by all Casework DNA Analyst trainees. CODIS DNA Analyst trainees need only complete CA designated sections and read the corresponding references. No practical examination, written examination, or competency is provided for this training section. The trainer will assess through discussion of the trainee's knowledge of the subject matter and document using the trainer's evaluation form.

STR TRAINING EVALUATION FORM – MODULE 1

INTRODUCTION – MODULE 1

     1.1   WSP New Employee Orientation CA   □

     1.2   Laboratory Safety Orientation CA   □

     1.3   Introduction to Quality Assurance/Quality Control CA   □

     1.4   The trainee has completed the above checked sections and is able to:
         1.4.1   Understand the expectations of the training program CA
         1.4.2   Explain the general operation of the laboratory CA

Comments:

_____ _____   _____ _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 2

SAMPLE AND/OR EVIDENCE CONTROL AND PRESERVATION - MODULE 2

2.1 Sample collection for biological trace evidence in conjunction with other laboratory analytical services and latent fingerprint analysis

☐

2.2 Minimizing the risk of contamination at a PCR level of sensitivity for detection CA

☐

2.3 Convicted Offender administrative process including: sample receipt, handling and Convicted Offender Form data entry. CA only

☐

2.4 The trainee has completed the above checked sections and is able to:
2.4.1 Successfully explain the proper procedures and precautions to be taken when handling and preserving evidence for DNA and latent fingerprint analysis.
2.4.2 Describe the order of examinations between the DNA Units, Trace Evidence Section, Chemistry Section, Firearms Section, Toxicology Section, Document Section and Latent Fingerprints.
2.4.3 Successfully explain the administrative process for convicted offender sample receipt, handling and Convicted Offender Form data entry. CA only

Comments:

_____ _____   _____ _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 3

FUNDAMENTAL SCIENTIFIC KNOWLEDGE - MODULE 3

3.1   All trainees must produce a resumé stating their education, work experience and professional activities. CA

☐

3.2   All trainees must also provide a copy of their college transcript(s). CA

☐

3.3   The trainee has completed the above checked sections and has shown:

3.3.1   College level course work covering the fundamental principles of genetics, biochemistry and molecular biology which provide a foundation for understanding forensic DNA analysis. (Note: If the analyst does not have college level coursework or documented training in statistics or population genetics, then the trainee will complete statistics/population genetics training as it pertained to forensic DNA analysis). CA

3.3.2   An understanding of fundamental scientific knowledge as it applies to forensic DNA analysis. CA

Comments:

_____ _____   _____   _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 4

APPLIED SCIENTIFIC KNOWLEDGE – MODULE 4

4.1   DNA Extraction and Purification CA   □

4.2   DNA Quantitation   CA   □

4.3   Polymerase Chain Reaction (PCR) CA   □

4.4   Short Tandem Repeat polymorphisms CA   □

4.5   Y Chromosome DNA Typing   □

4.6   Single Nucleotide Polymorphisms   □

4.7   Mitochondrial DNA   □

4.8   Population genetics and statistics   □

4.9   Automation in the Forensic DNA Lab CA   □

4.10   Expert Systems Software CA   □

4.11   Rapid DNA systems CA   □

4.12   Next Generation Sequencing CA   □

4.13   At the end of this session the trainee should be able to:

4.13.1   Discuss and display an in depth knowledge appropriate to their duties. CA
4.13.2   Prepare for laboratory analysis work assignments. CA

Written Exam Rating ____

(P – pass: 70% or greater correct answer F – fail: below 70% - additional work required)

Lecture Presentation Rating _____   Written Dissertation Rating _____

> (P – pass, met criteria: presented/stated material in a clear understandable manner, shows good comprehension of subject, able to answer questions (from lecture) to the satisfaction of the trainer, sufficient scientific detail provided to explain subject; PC – pass on condition of successful completion of further specified work, one or two of the preceding criteria not met, additional work assigned by trainer to meet criteria in consultation with DNA Technical Leader; F – fail, more than two of the preceding criteria not met)

> Comments:

_____ _____   _____ _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 5

LABORATORY ANALYSIS - MODULE 5

5.1   DNA Analyst

5.1.1   Sufficient single source stains (50)   □

5.1.1.1 At least 10 single source samples purified with the organic extraction protocol (optional)

5.1.2   10 single source competency samples   □

5.1.3   7 or more for differential extraction and analysis   □

5.1.4   3 contact/touch   □

5.1.5   10 hair samples   □

5.1.6   3 non-probative cases   □

5.1.7   All trainees have filled out the paperwork for CODIS access   □

5.2   CODIS Analyst

5.2.1   GeneMapper® ID-X data training set   □

5.2.2   GeneMapper® ID-X advanced data training set (anomalies)

5.2.3   Manual processing of 5 practice samples (extraction)   □

5.2.4   Contamination data set   □

5.2.5   Manual processing of 2 sets of 10 training samples (extraction)   □

5.2.6   Manual processing of 2 sets of 10 training samples (direct amp)
☐

5.2.7   96-well plate processing of 2 sets of ~40 training samples

5.2.8   All trainees have filled out the paperwork for CODIS access   ☐

5.2.9   At the end of this session the trainee should be able to:
    5.2.9.1 Competently perform PCR STR analysis on biological samples similar to what would be encountered in forensic DNA casework and/or forensic data bases. CA
    5.2.9.2 Demonstrate good laboratory technique for PCR STR analysis. CA

5.2.9   At the completion of this module, the trainee will be trained in the operation and maintenance of the following instruments:
    5.2.9.1 Casework Analyst:
        5.2.9.1.1 Any general laboratory equipment and instruments associated with the procedures used in DNA STR analysis such as autoclaves, water baths, pipettors, vortex, centrifuge, heat blocks, etc.
        5.2.9.1.2 AB 7500 SDS
        5.2.9.1.3 AB 9700 Thermal Cycler
        5.2.9.1.4 Qiagen BioRobot Universal
        5.2.9.1.5 Qiagen QIAgility
        5.2.9.1.6 AB Genetic Analyzer
        5.2.9.1.7 Qiagen EZ1 Robot

    5.2.9.2 CODIS Analyst
        5.2.9.2.1 For Manual Procedures:
            5.2.9.2.1.1 AB 7500 Real-Time PCR System
            5.2.9.2.1.2 AB 9700 Thermal Cycler
            5.2.9.2.1.3 AB 3500xL Genetic Analyzer
        5.2.9.2.2 For 96-well plate Procedures:
            5.2.9.2.2.1 BSD600 Duet Puncher
        5.2.9.2.3 Any equipment (pipettes, heat blocks, centrifuges, mini-centrifuges, vortexes, etc.) associated with the procedures for the instruments and equipment listed in 5.2.8.2.1 and 5.2.8.2.2

Comments:

_____ _____   _____ _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 6

MIXTURE INTERPRETATION, REPORT WRITING AND CODIS – MODULE 6

6.1   STR interpretation guidelines   □

6.2   Organization and contents of a case file   □

6.3   Use of ArmedXpert™ (if applicable)   □

6.4   Statistical calculation.   □

6.5   Paternity/Kinship   □

6.6   Report writing and LIMS   □

6.7   CODIS program CA   □

6.8   Interpretation of 20 mixture data sets   □

6.9   Use of CODIS Popstats Moderate Match Estimator (MME)   □

6.10   At the end of this session the trainee should be able to:

6.10.1   Correctly interpret casework STR data and write reports compatible with
          laboratory policy.
6.10.2   Explain the laboratory's CODIS program including eligibility guidelines and
          how samples are searched and/or uploaded. CA

Comments:

_____ _____   _____   _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 7

Y-STR DNA TYPING FOR CASEWORK – MODULE 7

    7.1   Scientific Knowledge

        7.1.1   Y Chromosome: Evolution & Biology   □

        7.1.2   Forensic Applications of Y-STR's   □

        7.1.3   Y Amplification Kit/Typing on the Genetic Analyzer   □

        7.1.4   Interpretation of Y-STR Data   □

        7.1.5   Y-STR Statistics & Population Databases   □

        7.1.6   Y-STR Testimony, Practice, and Observation   □

    7.2   Laboratory Analysis & Data Interpretation

        7.2.1   3 single source male extracts   □

        7.2.2   Interpretation of 6 sets of Y-STR data   □

    7.3   Y-STR Non-Probative Competency Test   □

    7.4   At the end of this session the trainee should be able to:

        7.4.1   Discuss and display an in depth knowledge of forensic Y-STR analysis.
        7.4.2   Competently perform Y-STR analysis on biological samples similar to what would be encountered in forensic DNA casework.
        7.4.3   Correctly interpret Y-STR data and write reports compatible with laboratory policy.
        7.4.4   Pass a Written Exam: Exam Rating_____   □
                      (P = Pass: 70% or greater correct answer, F = Fail: Below 70% - additional work required)

_____ _____ _____

Trainee   **Date**   **Trainer**   **Date**

STR TRAINING EVALUATION FORM – MODULE 8

LEGAL ISSUES - MODULE 8

    8.1   Courtroom procedures and rules of evidence process. CA   ☐

    8.2   DNA Analyst qualifications CA   ☐

    8.3   Technical Testimony   ☐

    8.4   Testimony practice (direct and cross examination)   ☐

    8.5   Ethical responsibility of expert witness. CA   ☐

    8.6   Evidence/Exhibit presentation. CA   ☐

    8.7   DNA Database legal authority (State and Federal). CA   ☐

    8.8   Review curriculum vitae and observe expert witness testimony. CA   ☐

    8.9   Moot court.   ☐

At the end of this session the trainee should be able to:

    8.9.1   Understand the legal system for Washington State as it pertains to expert witnesses. CA

    8.9.2   Provide unbiased, clear and easy to understand expert testimony on forensic DNA analysis.

Note: Moot court can be completed retroactively prior to the candidate's first court testimony.

Comments:

_____ _____   _____   _____

Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 9

FINAL EVALUATION – MODULE 9

9.1   Casework DNA Analyst Competency Test   ☐
(a case made from the single source competencies or known result non-probative case from Module 5)

9.2   CODIS DNA Analyst Competency Test: Manual (extraction) Manual (direct amplification)

9   ☐

Comments:

_____ _____   _____   _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

STR TRAINING EVALUATION FORM – MODULE 10

COGNITIVE BIAS - MODULE 10

10.1   Types of bias CA   □

10.2   Ways to minimize cognitive bias CA   □

Comments:

_____ _____   _____   _____
Trainee   Date   Trainer or Reviewer   Date
Printed Name + initials   Printed Name + initials

Module 1 - Reference Reading Assignments and Sign-off Record

TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
The FBI Quality Assurance Standards for Forensic DNA Testing Laboratories (Current Version) – Identify significance as related to audits and accreditation.		
The FBI Quality Assurance Standards for DNA Databasing Laboratories CA only (Current Version) – Identify significance as related to audits and accreditation.		
WSP CLD Biochemical Analysis Training Program Manual, Section 1 – Introduction and Section 2 – Safety. CA		
WSP CLD DNA Analysis Quality Assurance Manual. CA		
WSP CLD Quality Manual and the CLD Operations Manual CA – Identify why there is a separate DNA QA Manual.		
FBI DNA Audit Document for Forensic DNA Testing Laboratories (Current Version) – Review the lab's previous audit findings and responses.		
FBI DNA Audit Document for Forensic DNA Databasing Laboratories CA only (Current Version) – Review the lab's previous audit findings and responses.		
Butler, J. Forensic DNA Typing book series, Chapter covering – Quality Assurance and Laboratory Validation. Elsevier Academic Press, current version. CA		

Module 2 - Reference Reading Assignments and Sign-off Record   TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
CLD Operations Manual: sections on Evidence Handling (3.1 Handling and Preserving the Integrity of Evidence, 3.4 Evidence Items Produced During Casework, 3.6 Limited Samples, 3.9 Evidence Storage, 3.10 Evidence Return, 3.13 Loss, Cross Transfer, or Contamination of Evidence)		
ASTM Committee E-30, Standard Guide for Physical Evidence Labeling and Related Documentation, April 1992; E 1459 – 92 (Re-approved 1998) CA		
ASTM Committee E-30, Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Laboratory, November 1992; E 1492 – 92. CA		
Committee on DNA Forensic Science, National Research Council (1996) The Evaluation of DNA Evidence, Chapter 3, Ensuring High Standards of Laboratory Performance, 75-88. CA		
Committee on DNA Forensic Science, National Research Council (1992) DNA Technology in Forensic Science, Chapter 4, Ensuring High Standards, 97-110. CA		
Gill, P. and Kirkham, A, Development of a Simulation Model to Assess the Impact of Contamination in Casework Using STRs. J. Forensic Sci. 2004; 49 (3), 485-491		
Sullivan, K. Johnson, P., Rowlands, D., and Allen, H. New developments and challenges in the use of the UK DNA Database: addressing the issue of contaminated consumables. Forensic Science International, 2004, 146, S175-S176. CA		
Lee, H.C. and Ladd, C. Preservation and Collection of Biological		

Evidence. Croatian Medical Journal 2001; 42(2), 225-228.		
Sundquist, T. and Bessetti, J., Identifying and Preventing DNA Contamination in a DNA-Typing Laboratory. Profiles In DNA 2005, September, 11-13. CA		
Scherczinger, C.A., Ladd, C., Bourke, M.T. and Lee, H.C. A systematic approach to PCR contamination. J. Forensic Sci. 1999; 44 (5), 1042-1045. CA		
Amick, J., Bivins, D., Cathcart, K., Hammer, L. and Pippin, T. Integrating DNA Collection into the Latent Print Section. J. Forensic Identification, 2004, 54(2), 170-177.		
WSP Latent Prints Technical Manual, "Items with Biological Contaminants" Section -Note that the WSP Latents Section does occasionally collect DNA and has internal guidelines for collecting DNA and handling DNA and Latents evidence together.		
WSP JusticeTrax W2 to LIMS-plus Interface User Guide (most current version) CA - only		
Testing the Effectiveness of the Stratalinker UV Crosslinker in Eliminating Contaminating DNA from Laboratory Consumables CA only		
DNAStable system validation and local write-ups		

Module 3 - Reference Reading Assignments and Sign-off Record

TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
Shutler, G. Forensic Botany; Principles and Applications to Criminal Casework. Chapter 8 – An Overview of Historical Developments in Forensic DNA Analysis,, CRC Press, 2005, 117-135		
Butler, J. Forensic DNA Typing book series, Chapter covering – Overview and History of DNA Typing, Elsevier Academic Press, current version. CA – Be aware of legacy DNA typing methods		
Butler, J. Forensic DNA Typing book series, Chapter covering – DNA Biology Review, Elsevier Academic Press, current version. CA		
Committee on DNA Forensic Science, National Research Council (1992) DNA Technology in Forensic Science, Summary, 1-26.		
Committee on DNA Forensic Science, National Research Council (1996) The Evaluation of Forensic DNA Evidence, 1-8 Compare with 3.3.4		

Module 4 - Reference Reading Assignments and Sign-off Record   TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
Butler, J. Forensic DNA Typing, Chapter 3 – Sample Collection, DNA Extraction, and Quantitation), Elsevier Academic Press, 2005, 33-62. CA		
DNA IQ™ System-small sample casework protocol. Technical Bulletin, No. 296. Promega, June 2002. CA only		
Gill, P. The utility of 'substrate controls' in relation to 'contamination'. Forensic Sci. Int., 1997, 85,105-111.		
Gill, P., Jeffreys, A.J. and Werrett, D.J. Forensic application of DNA 'fingerprints'. Nature, 1985; 318(6046): 577-579.		
DNA IQ™ System-database sample protocol. Technical Bulletin No. 297. Promega, June 2002. CA only		
Primorac, D., The role of DNA technology in identification of skeletal remains discovered in mass graves, Forensic Sci. Int. 2004, 146S, S163-S164.		
Concentrating and Desalting DNA or RNA with Microcon or Centricon Centrifugal Filters, Millipore Corp protocol WWW-UF. CA		
DNA IQ™ system WSP CODIS LAB Internal Validation reports. CA only		
Butler, J. Forensic DNA Typing book series, Chapters covering Quantitation, Elsevier Academic Press, current version. CA		
PowerQuant System technical Manual #TMD047		
Epstein, D.M., Tebbett, I.R. and Boyd, S.E. Eliminating Sources of Pipetting Error in the Forensic Laboratory. Forensic Science Communications, 2003, 5(4), 1-8. CA		
Quantifiler Users Manual, Applied Biosystems (most current version) CA only		
Quantifiler ABI PRISM® 7000 Sequence Detection System WSP CODIS Lab Internal Validation		

Summaries CA only		
Green, R.L., Ines, R., Boland, C. and Hennessy, L.K. Developmental Validation of the Quantifiler™ Real-Time PCR Kits for the Quantification of Human Nuclear DNA Samples. J. Forensic Sci.2005. 50(4) 809-825. CA only		
AB 7500 Sequence Detection System WSP CODIS Lab Performance Verification reports. CA only		
Bode Validation and CLD supplemental Summary Report of the PowerQuant Validation, lab validation binders and the pertinent Casework STR Procedures Manual sections on the PowerQuant use and interpretations.		
PowerQuant System technical Manual, Promega #TMD047 (or most recent version)		
Ewing, M.M. et al. Human DNA quantification and sample quality assessment: Developmental validation of the PowerQuant Forensic Science International: Genetics 23 (2016) 166-177		
Butler, J. Forensic DNA Typing book series, Chapters covering – The Polymerase Chain Reaction (DNA Amplification); DNA separation methods: slab-gel and capillary electrophoresis; DNA detection methods: fluorescent dyes and silver staining; Instrumentation for STR Typing: ABI 310, ABI 3100, FMBIO, AB3500 Systems, Elsevier Academic Press, current version. CA		
Kline, M.C., Redman, J.W. and Butler, J.M., Training on STR Typing Using Comercial Kits and ABI 310/3100. NIST, Oct. 22-26, 2001, two Powerpoint presentations on CD and assessable on line; www.cstl.nist.gov/div831/strbase/. CA		
Saiki, R. K., Gelfand, D. H., Stoffel, S., Scharf, S. J., Higuchi, R., Horn, G. T., Mullis, K. B., and Erlich, H.		

A., Primer-Directed Enzymatic Amplification of DNA with a Thermostable DNA Polymerase, Science, 1988, 239, 487-491.		
Applied Biosystems Technical Note: "Considerations for Evaluating Carryover on Applied Biosystems Capillary Electrophoresis Platforms in a HID Laboratory", June 2012		
Butler, J. Forensic DNA Typing book series, Chapter covering – Commonly used short tandem repeat markers and commercial kits, Elsevier Academic Press, current version. CA		
Butler, J. Forensic DNA Typing book series, Chapter covering – Biology of STRs: Stutter products, non-template addition, microvariants, null alleles, and mutation rates, Elsevier Academic Press, current version. CA		
Butler, J. Forensic DNA Typing book series, Chapters covering – Forensic Issues: Degraded DNA, PCR Inhibition, Contamination, Mixed Samples and Low Copy Number, Elsevier Academic Press, current version. CA		
Investigations to assist in the interpretation of DNA profiles, Applied Biosystems HID University Presentation August 27, 2009		
Meldgaard, M. and Morling, N. Detection and quantitative characterization of artificial extra peaks following polymerase chain reaction amplification of 14 short tandem repeat systems used in forensic investigations. Electrophoresis, 1997, 18, 1928-1935.		
Hendrickson, B.C., Leclair, B., Forrest, S., Ryan, J., Ward, B.E., Petersen, D. Kupferschmid, T.D. and Scholl, T. Accurate STR allele designations at the FGA and vWA loci despite primer site polymorphisms. J.Forensic Sci. 2004, 49(2): 250-254.		
Rolf, B., Wiegand, P. and Brinkmann, B. Somatic mutations at STR loci – a		

reason for three allele pattern and mosaicism. Forensic Science Int., 2002, 126, 200-202. CA		
Walsh, P.S., Fildes, N.J., Reynolds, R., Sequence Analysis and Characterization of Stutter Products at the Tetranucleotide Repeat Locus vWA, Nucleic Acids Research, 1994, 24 (14), 2807-2812.		
WSP CODIS Laboratory 3500xL Internal Validation Reports. CA only		
Manufacturer's literature, user bulletins, product enclosures and/or Applied Biosystems™ manuals for 3500/3500xL (as applicable) CA.		
Gibb, A.J., Huell, A., Simmons, M.C., Brown, R.M. Characterisation of forward stutter in the AmpFISTR® SGM Plus® PCR. Science and Justice, 49 (2009): 24-31. CA only		
Promega PowerPlex® Fusion 6C System Technical Manual #TMD045 (current version) CA		
Ensenberger, M.G, Lenz, K.A, Matthies, L.K., Hadinoto, G.M., Schienman, J.E., Przech, A.J., Morganti, M.W., Renstrom, D.T., Baker, V.M., Gawrys, K.M., Hoogendoorn, M., Steffen, C.R., Martín, P., Alonso, A., Olso, H.R., Sprecher, C.J., and Storts, D.R. Developmental validation of the PowerPlex® Fusion 6C System, Forensic Sci. Int. Genet. 21 (2016) 134-144. CA		
Hares, D. Selection and Implementation of Expanded CODIS Core Loci in the United States, Forensic Sci. Int. Genet. 17 (2015) 33-34. CA		
WSP CLD - Evaluation of Expanded Loci Amplification Kits (summary), October 2015.		
WSP CLD System Summary - Internal Validation for the PowerPlex® Fusion 6C Amplification System Kit, 2016.		
WSP CLD Specific Crime Lab's Summary - Internal Validation for		

the PowerPlex® Fusion 6C Amplification System Kit, 2016.		
Validation of Direct Amplification using the PowerPlex® Fusion 6C System, 3500xL Genetic Analyzer, and BSD600-Duet Automated Punch Instrument (Bode Cellmark Forensics, Inc., December 2016) CA only		
Promega PunchSolution™ Kit Technical Manual #TMD038 (current version) CA only		
BSD600 DUET Puncher User Manual (current version) CA only		
Bright, J.A. et al. A Guide to Forensic DNA Interpretation and Linkage. Promega Corporation Web site. http://www.promega.com/ resources/profiles-in-dna/2014/a-guide-to-forensic-dna-interpretation-and-linkage/ Updated 2014.		
Genescan™ 600 LIZ® Size Standard v2.0 product insert p/n 4366591 May 31, 2006 Y-STR only		
Wenxiao Jiang, Margaret Kline, Peter Hua, Yue Wanga, Identification of dual false indirect exclusions on the D5S818 and FGA loci. Legal Medicine 2011 13:30-34		
Forensic Science Communications, July 2001, Vol. 3, Number 3.		
Butler, J. Forensic DNA Typing book series, Chapter covering – Y Chromosome DNA Testing, Elsevier Academic Press, current version.		
Summary Report on the WSP CLD Internal Validation of the YSTR Yfiler® Kit for Casework Use, October 2009: Male-Female Mixture study only.		
WSP Internal Validation of the AmpFℓSTR® Yfiler® on the Applied Biosystems 3500 Genetic Analyzer: Sensitivity/Stochastic study only.		
Supplemental 3500 Validation Experiment – Yfiler® Mixture Study, March 2015.		
Butler, J. Forensic DNA Typing book series, Chapter covering – Single		

Nucleotide Polymorphisms and Other Bi-Allelic Markers, Elsevier Academic Press, current version.		
Eisenberg, A.R. Forensic Mitochondrial DNA Analysis, A Different crime		
Butler, J. Forensic DNA Typing book series, Chapter covering – Mitochondrial DNA Analysis, Elsevier Academic Press, current version		
Evett, I.W. and Weir BS., in Interpreting DNA Evidence, Statistical Genetics for Forensic Scientists, Chapter 4 - Population Genetics, Chapter 5 - Statistical Genetics, Chapter 8 - Calculating Match Probabilities, and Chapter 9 - Presenting Evidence, Sinauer Assoc., Sunderland, MA, 1998.		
Lander, E.S. and Budowle, B. DNA fingerprinting dispute laid to rest. Nature, 1994, 371, 735-738.		
DNA Technology in Forensic Science, National Research Council National Academy Press, Washington, D.C. (1992) Chapter 3, 74-96.		
Committee on DNA Forensic Science, National Research Council (1996) The Evaluation of Forensic DNA Evidence, Chapter 4, 89-124, Chapter 5, 125-165.		
Budowle, B., Shea, B., Niezgoda, S. and Chakraborty, R. CODIS STR Loci Data from 41 sample populations. J. of Forensic Sci., 2001, 46(3), 453-489.		
Budowle, B., Moretti, T., Baumstark, A.L., Defenbaugh, D.A. and Keys, K.M. Population Data on the 13 CODIS core STR Loci in African Americans, US Caucasians, Hispanics, Bahamians, Jamaicans and Trinidadians. J. of Forensic Sci., 1999, 44(6), 1277-1286. And Erratum J Forensic Sci, 2015 doi: 10.1111/1556-4029.12806		

Butler, J. Forensic DNA Typing book series, Chapters covering – Basic Genetic Principles, Statistics, and Probability; STR Population Database Analysis; Profile Frequency Estimates, Likelihood Ratios, and Source Attribution; Approaches to Statistical Analysis of Mixtures and Degraded DNA; Kinship and Parentage Testing; Mass Disaster DNA Victim Identification. Elsevier Academic Press, current version.		
Myers, S., Timken, M., Piucci, M., Sims, G., Greenwalk, M., Weigand, J., Konzak, K., and Buoncristiani, M. Searching for First-Degree Familial Relationships in California's Offender DNA Database: Validation of a Likelihood Ratio-Based Approach. Forensic Sci. Int. Genet. (2010) CA		
Steinberger, E., and Sims, G. Finding Criminals Through the DNA of Their Relatives-Familial Searching of the California Offender DNA Database. Prosecutor's Brief (Vol. XXXI, Nos. 1 & 2, 28-32. CA		
Butler, J. Forensic DNA Typing book series, Chapter covering – Familial DNA Searches. Elsevier Academic Press, current version. CA		
Monpetit, S.A., Fitch, I.T. and O'Donnell, P.T. A Simple Automated Instrument for DNA Extraction in Forensic Casework. J. Forensic Sci. 2005. 50(3) 555- 563.		
Butler, J. Forensic DNA Typing book series, Chapter covering – New Technologies Automation and Expert Systems, Elsevier Academic Press, current version. CA		
Ram Kishore,W. Hardy, Reef , Anderson Vince J., Sanchez, Nick A and Buoncristiani, Martin R. Optimization of DNA Extraction from Low-Yield and Degraded Samples Using the BioRobots EZ1 and BioRobots M48 J. Forensic Sci, 51(5) 1055-1061		

Anslinger, Katja Bayer, Birgit, Rolf, Burkhard, Keil, Wolfgang, Eisenmenger, Wolfgang Application of the BioRobot EZ1 in a forensic laboratory. J. Legal Medicine 7 (2005) 164–168.		
Summary of WSP CLD EZ1 internal validation (in validation work binders)		
EZ1 DNA Investigator Handbook		
Reports on Automation internal validation summaries WSP CLD (Universal and QIAgility).		
Perlin, M.W. and Szabady, B. Linear Mixture Analysis: A Mathematical Approach to Resolving Mixed DNA Samples. J. Forensic Sci.2001. 46(6) 1372-1378.		
GMID-X as an NDIS-Approved Expert System, WSP CODIS Lab Internal Validation reports. CA only		
Tan, E. et.al. Fully integrated, fully automated generation of short tandem repeat profiles. Investigative Genetics 2013, 4:16		
Budowle, B. PDF presentation from ISHI 2013		
Heger, M. Early Adopters Say NGS-based Forensic Testing Could Lead to More Precise Identification. GenomeWeb, October 23, 2012		

**Module 5 - Reference Reading Assignments and
Sign-off Record**

TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
WSP CLD Casework or CODIS (as applicable) STR Analysis Procedures manual – the appropriate laboratory analysis/preparation and guidelines for interpreting STR analysis data sections CA		
Linch, C.A., Smith, S.L. and Prahlow, J.A. Evaluation of the Human Hair Root for DNA Typing Subsequent to Microscopic Comparison. J. of Forensic Sci., 1998, 43(2) 305-314.		

Module 6 - Reference Reading Assignments and Sign-off Record   TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
WPS CLD STR Analysis Procedures manual – Guidelines for Evaluating DNA Typing Profile Data and Guidelines for Report Writing sections		
WSP CLD Quality Manual case records section (9.0 Case records, reviews, and reports, 9.2 Case documentation, 9.4 Case review, 9.5 Technical Peer Review in Special Situations, and 9.6 Resolution of technical differences of opinion).		
WSP CLD Operations Manual Case Management sections (4.0 Case Management, 4.3 Casework Reports, and 4.4 Case Files).		
WSP SOPs, Forms Appendix – Laboratory Reports		
Barbaro, A., Cormaci, P. and Barbaro, A. DNA analysis from mixed biological materials. Forensic Sci. Int. 2004, 146S: S123-S125.		
Duewer, D.L., Kline, M.C., Redman, J.W., Newall, P.J. and Reader, D.J., NIST Mixed Stain Studies #1 and #2: Interlaboratory Comparison of DNA Quantification Practice and Short Tandem Repeat Multiplex Performance with Multiple-Source Samples. J. Forensic Sci., 2001, 46(5), 1199-1210.		
Butler, J. Forensic DNA Typing book series, Chapter covering – Combined DNA Index System (CODIS) and the Use of DNA Databases, Elsevier Academic Press, current version. CA		
NDIS Forensic Index Decision Tree-CODIS CJIS SEN CA		
CODIS Training PowerPoints-posted on CLD SharePoint (DNA Functional Area Manuals). CODIS Training PowerPoints. CA		
CODIS 7.0 Software, Computer Based Training (as assigned by LDIS administrator) – CODIS Learning Management System		
WSP Convicted Offender/CODIS Program SOP Manual CA		
ArmedXpert Users Manual, if applicable		

Developmental Validation of ArmedXpert, R. Roby et.al. Powerpoint. If applicable.		
CLD Summary Report of the ArmedXpert Internal Validation. If applicable.		
Mixture Workshop "Intro to 2-3 persons" presentation, 2012 AAFS meeting http://www.armedxpert.com/mixture-workshop-2012/ If applicable.		
Bille, T., Bright, J., and Buckleton, J. Application of Random Match Probability Calculations to Mixed STR Profiles, J. Forensic Sci., March 2013, 58, #2, 474-485.		
Popstats Parentage Statistics, Strength of Genetic Evidence in Parentage Testing, Eisenberg, A.J., Powerpoint Presentation.		
Interpreting DNA Evidence, Evett, I. and Weir, B.,Sinauer Publishers 1998, 163-164 and 225-226.		
Relatedness Statistics, Eisenberg, A. and Planz, J., Applied Forensic Statistics, Oct 2007 Powerpoint Presentation.		
Abaz, J., Walsh, S.J., Curran, J.M., Moss, D.S., Cullen, J., Bright, J., Crowe, G., Cockerton, S.L. and Power, T.E.B., Comparison of the variables affecting the recovery of DNA from common drinking containers. Forensic Science Int., 2002, 126, 233-240.		
Brauner, P. DNA Typing and Blood Transfusion. J. Forensic Sci. 1995, 41(5): 895-897.		
Lorente, M., Entrala, C., Lorente, J.A., Alvarez, J.C., Villanueva, E. and Budowle, B., Dandruff as a potential source of DNA in forensic casework. J. Forensic Sci. 1998, 43(4): 901-902.		
Shutler, G.G., Gagnon, P., Verret, G., Kalyn, H., Korkosh, S, Johnston, E. and Halverson, J. Removal of a PCR Inhibitor and Resolution of		

DNA STR Types in Mixed Human-Canine Stains from a Five Year Old Case. J. Forensic Sci. 1999, 44(3): 623-626.		
Sweet, D. and Shutler, G.G., Analysis of salivary DNA evidence from a bite mark on a body submerged in water. J. Forensic Sci. 1999, 44(5): 1069		
Wegel Jr., J.G. and Herrin Jr., G., Deduction of the order of sexual assaults by DNA analysis of two condoms. J. Forensic Sci. 1994, 39(3): 844		
Wiegand, P. and Kleiber, M., DNA typing of epithelial cells after strangulation. Int. J. Legal. Med., 1997, 110, 181		
Wickenheiser, R.A. Trace DNA: A Review, Discussion of Theory, and Application of the Transfer of Trace Quantities of DNA Through Skin Contact. J. Forensic Sci. 2002; 47(3), 442		
Essential Mathematics and Statistics for Forensic Science, Adams, C., John Wiley & Sons Publishers, 2010, Chapter 11.		

Module 7 - Reference Reading Assignments and Sign-off Record   TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
Butler, John M., Forensic DNA Typing book series, Chapter covering Y Chromosome DNA Testing, Elsevier Academic Press, current version.		
Jobling, Mark A. and Chris Tyler-Smith. "The human Y chromosome: an evolutionary marker comes of age," Nature Reviews Genetics, Vol. 4, August 2003, 598-612.		
Gill, P., Brenner, C., Brinkmann, B. et al. DNA Commission of the International Society of Forensic Genetics: Recommendations on forensic analysis using Y-chromosome STRs, International Journal of Legal Medicine (2001) 114:305–9 and Forensic Science International (2001) 124:5–10.		
Gusmão, L., Butler, J. M., Carracedo, A. et al. DNA Commission of the International Society of Forensic Genetics (ISFG): An update of the recommendations on the use of Y-STRs in forensic analysis, Forensic Science International (2006) 157:187–197 and International Journal of Legal Medicine (2006) 120:191–200.		
Butler, JM, Recent Developments in Y-single tandem repeat and Y-single nucleotide polymorphism analysis, Forensic Science Review, Vol 15, 2003, pages 91-100.		
Marshall University Forensic Science Center, Forensic Y-STR Training Program, Y Chromosome: Molecular Biology and Mutations presentation.		
Marshall University Forensic Science Center, Forensic Y-STR Training Program, Y Chromosome: Genetics and Anthropology presentation.		
Marshall University Forensic Science Center, Forensic Y-STR Training Program, Y Chromosome: Evolution and Forensic Applications presentation.		
Applied Biosystems. User's Manual: AmpFℓSTR YFiler PCR Amplficiation Kit, 2006, Part Number-4358101, Rev.C.		
Mulero, J.J., et al. "Development and Validation of the AmpFℓSTR® Yfiler™ PCR Amplification Kit: A Male Specific, Single Amplification 17 Y-STR Multiplex System." J Forensic Sci., January 2006, Vol. 51, No. 1, pgs 64-75.		

Summary Reports on: "WSP Internal Validation of the Applied Biosystems AmpF*l*STR® Yfiler® PCR Amplification Kit on the ABI 3130 Genetic Analyzer"		
Butler, J. M., Decker, A. E., Kline, M. C., and Vallone, P. M. Chromosomal duplications along the Y-chromosome and their potential impact on Y-STR interpretation, Journal of Forensic Sciences (2005) 50:853–859.		
SWGDAM Y-chromosome Short Tandem Repeat (Y-STR) Interpretation Guidelines. Forensic Science Communications. January 2009. Volume 11 Number 1.		
SWGDAM Interpretation Guidelines for Y-Chromosome STR Typing (2014)		
US Y-STR Database. http://usystrdatabase.org, Current Version: Introduction, User Directions, and Database Descriptive Statistics.		
Budowle, B., Ge, J. Chakraborty, R. Basic Principles for Estimating the Rarity of Y-STR Haplotypes Derived from Forensic Evidence.		
Marshall University Forensic Science Center, Forensic Y-STR Training Program, Y-STR Databases presentation.		
Marshall University Forensic Science Center, Forensic Y-STR Training Program, Y-STR Statistics presentation.		

Module 8 - Reference Reading Assignments and Sign-off Record   TRAINEE _____

REFERENCE	INITIALS	DATE COMPLETED
A Citizen's Guide to Washington Courts. http://www.courts.wa.gov/ CA – Organization of WA courts		
Coleman, H. and Swenson, E., DNA in the Courtroom: A Trial Watcher's Guide.1994, ISBN 0-9644507-0-4. – Expert Witness Testimony material.		
DNA related court decisions. http://www.denverda.org CA – Interesting case: Primer sequence disclosure.		
Donnelly, P. and Friedman, R.D. DNA database searches and the legal consumption of scientific evidence. 1999, Michigan Law Review, 97, 931-984.		
Robertson, J., Integrity issues impacting on the provision of forensic services. Australian J. of Forensic Sciences, 1999, 31, 87-97.		
Committee on DNA Forensic Science, National Research Council (1992) DNA Technology in Forensic Science, Chapter 6, Use of DNA Information in the Legal System and Chapter 7, DNA Typing and Society, 131-164 (see 7.3.7.1).		
Committee on DNA Forensic Science, National Research Council (1996) The Evaluation of Forensic DNA Evidence, Chapter 1, Introduction, 47-59 and Chapter 6, DNA Evidence in the Legal System, 166-211. – Significant changes between the 2 NRC reports.		
Review the WSP DNA QA Manual section on discovery and the CLD Operations Manual sections 4.7 Courtroom Testimony, 5.2.9 Observation/Document Review by Outside Experts,		

and 5.2.10 Interviewing Employees.		
Holmgren, J., DNA Evidence and Jury Comprehension. Can. Soc. Forensic Sci. 2005, 38(3), 123-141.		
Committee on Identifying the Needs of the Forensic Science Community; Committee on Applied and Theoretical Statistics, National Research Council, Strengthening Forensic Science in the United States: A Path Forward (2009)		

Module 10 - Reference Reading Assignments and Sign-off Record   Trainee_____

Reference	Initials	Date Completed
CLD Cognitive Bias PowerPoint Presentation CA		
Prediction in Forensic Science: a critical examination of common understandings, Biederman, A et al, Frontiers in Psychology, June 2015, Volume 6:737. doi: 10.3389/fpsyg.2015.00737		
Subjectivity and bias in Forensic DNA mixture interpretation, Dror, Hampikian, Science and Justice, 51 (2011), p. 204-208 CA		

REVISIONS BEFORE SHAREPOINT TRACKING

Original   version 12-2002

Revision 1   version 05-2006

- GMID, RT PCR, robotics updates

Revision 2   version 09-2008

- ISO update and outsourced training info addition

Revision 3 August 2009   August 2009

- Reflect changes for CODIS scientist training

- Reflect addition of EZ1 platform

- Change to Introduction

- Minor grammatical/spelling changes

Revision 4 November 2009   Manual Revised February 2010

- Burritt's Spreadsheet

- Reflect addition of Y-STR Technology